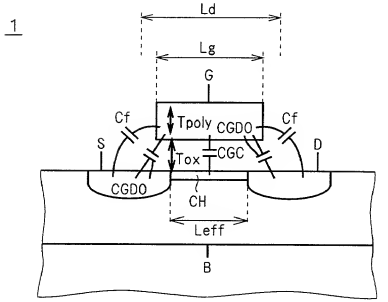
FIG. 1



09252020 "OPTED"

FIG. 2

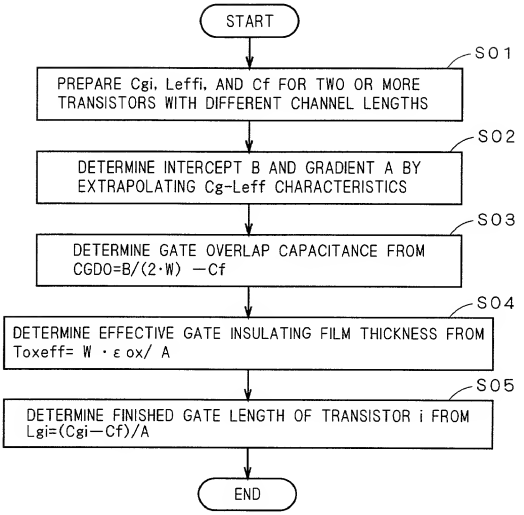
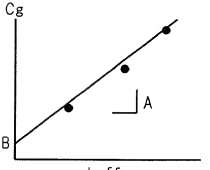

START
S01
PREPARE Cgi, Leffi, AND Cf FOR TWO OR MORE TRANSISTORS WITH DIFFERENT CHANNEL LENGTHS
S02
DETERMINE INTERCEPT B AND GRADIENT A BY EXTRAPOLATING Cg-Leff CHARACTERISTICS
S03
DETERMINE GATE OVERLAP CAPACITANCE FROM CGDO=B/(2·W) −Cf
S04
DETERMINE EFFECTIVE GATE INSULATING FILM THICKNESS FROM Toxeff= W · ε ox/ A
S05
DETERMINE FINISHED GATE LENGTH OF TRANSISTOR i FROM Lgi=(Cgi−Cf)/A
END

FIG. 3



$A = \varepsilon ox \cdot W / Toxeff$

$B = 2 \cdot (CGDO + Cf) \cdot W$

EP 0 691 687 A1

FIG. 4

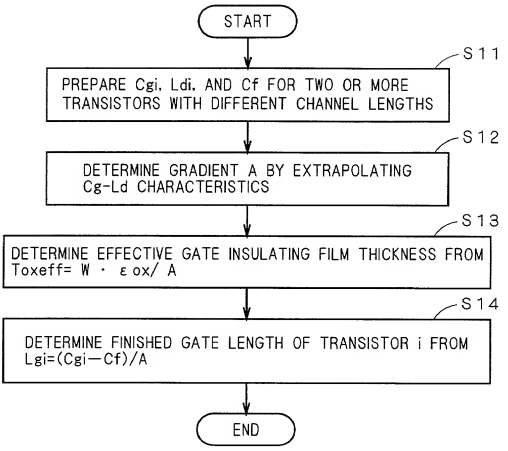

START
S11
PREPARE Cgi, Ldi, AND Cf FOR TWO OR MORE TRANSISTORS WITH DIFFERENT CHANNEL LENGTHS
S12
DETERMINE GRADIENT A BY EXTRAPOLATING Cg-Ld CHARACTERISTICS
S13
DETERMINE EFFECTIVE GATE INSULATING FILM THICKNESS FROM Toxeff= W · ε ox/ A
S14
DETERMINE FINISHED GATE LENGTH OF TRANSISTOR i FROM Lgi=(Cgi−Cf)/A
END

FIG. 5

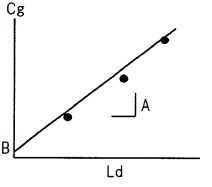

Cg
A
B
Ld

FIG. 6

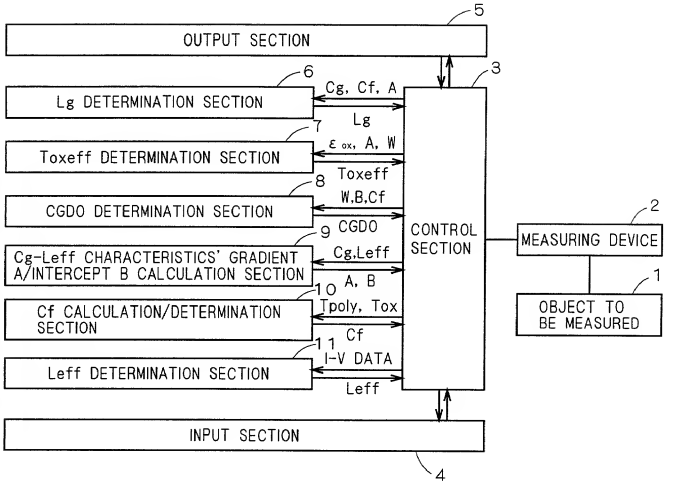
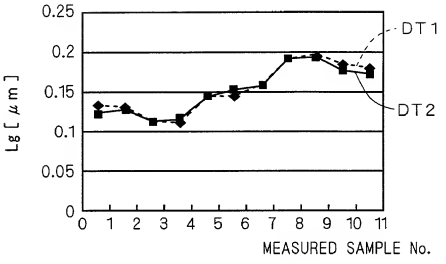

5
OUTPUT SECTION
6
Lg DETERMINATION SECTION
Cg, Cf, A
3
Lg
7
Toxeff DETERMINATION SECTION
ε ox, A, W
Toxeff
8
CGDO DETERMINATION SECTION
W,B,Cf
2
9
CGDO
CONTROL SECTION
MEASURING DEVICE
Cg-Leff CHARACTERISTICS' GRADIENT A/INTERCEPT B CALCULATION SECTION
Cg,Leff
1
10
A, B
OBJECT TO BE MEASURED
Cf CALCULATION/DETERMINATION SECTION
Tpoly, Tox
11
Cf
I-V DATA
Leff DETERMINATION SECTION
Leff
INPUT SECTION
4

FIG. 7



EP 1 667 201 A1

FIG. 8

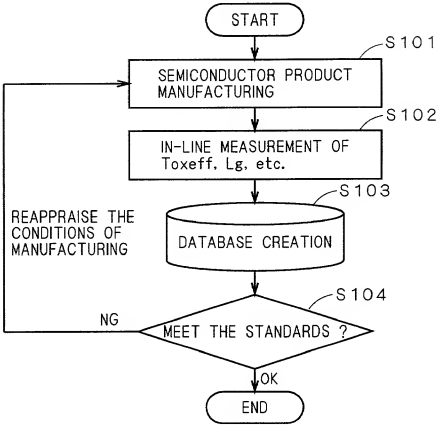

START
S101
SEMICONDUCTOR PRODUCT MANUFACTURING
S102
IN-LINE MEASUREMENT OF Toxeff, Lg, etc.
S103
REAPPRAISE THE CONDITIONS OF MANUFACTURING
DATABASE CREATION
S104
NG
MEET THE STANDARDS ?
OK
END

FIG. 9

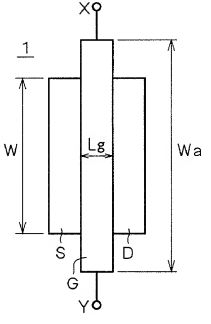

X
1
W
Lg
Wa
S
D
G
Y

FIG. 10

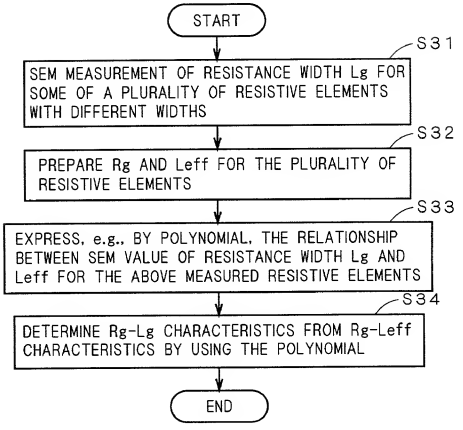

START
S31
SEM MEASUREMENT OF RESISTANCE WIDTH Lg FOR SOME OF A PLURALITY OF RESISTIVE ELEMENTS WITH DIFFERENT WIDTHS
S32
PREPARE Rg AND Leff FOR THE PLURALITY OF RESISTIVE ELEMENTS
S33
EXPRESS, e.g., BY POLYNOMIAL, THE RELATIONSHIP BETWEEN SEM VALUE OF RESISTANCE WIDTH Lg AND Leff FOR THE ABOVE MEASURED RESISTIVE ELEMENTS
S34
DETERMINE Rg-Lg CHARACTERISTICS FROM Rg-Leff CHARACTERISTICS BY USING THE POLYNOMIAL
END

FIG. 11

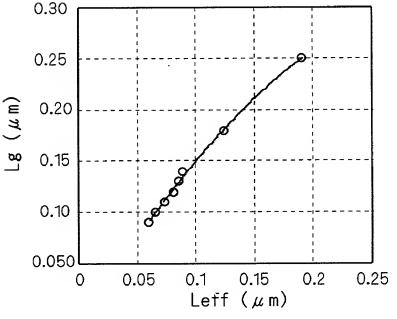

0.30
0.25
0.20
0.15
0.10
0.050
Lg (μm)
0
0.05
0.1
0.15
0.2
0.25
Leff (μm)

FIG. 12

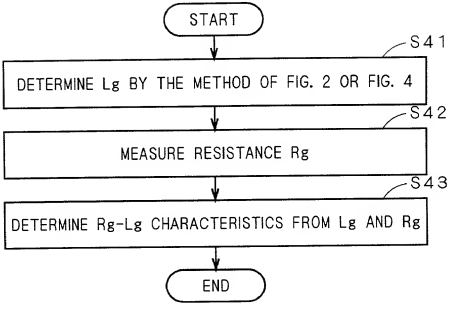

START
S41
DETERMINE Lg BY THE METHOD OF FIG. 2 OR FIG. 4
S42
MEASURE RESISTANCE Rg
S43
DETERMINE Rg-Lg CHARACTERISTICS FROM Lg AND Rg
END

FIG. 13

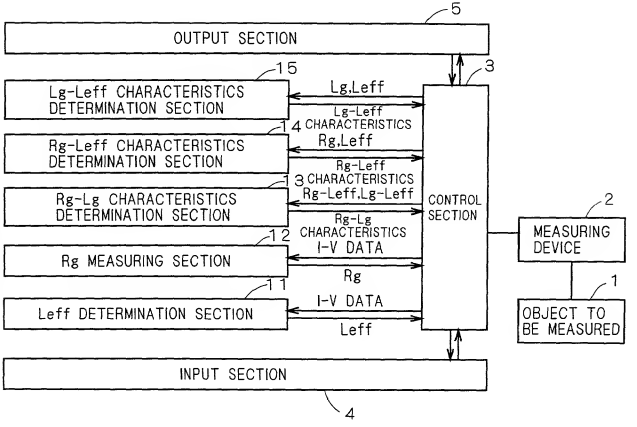

5
OUTPUT SECTION
15
Lg-Leff CHARACTERISTICS DETERMINATION SECTION
Lg.Leff
Lg-Leff CHARACTERISTICS
14
Rg-Leff CHARACTERISTICS DETERMINATION SECTION
Rg.Leff
Rg-Leff CHARACTERISTICS
13
Rg-Lg CHARACTERISTICS DETERMINATION SECTION
Rg-Leff.Lg-Leff
Rg-Lg CHARACTERISTICS
12
Rg MEASURING SECTION
I-V DATA
Rg
11
Leff DETERMINATION SECTION
I-V DATA
Leff
3
CONTROL SECTION
2
MEASURING DEVICE
1
OBJECT TO BE MEASURED
INPUT SECTION
4

FIG. 14

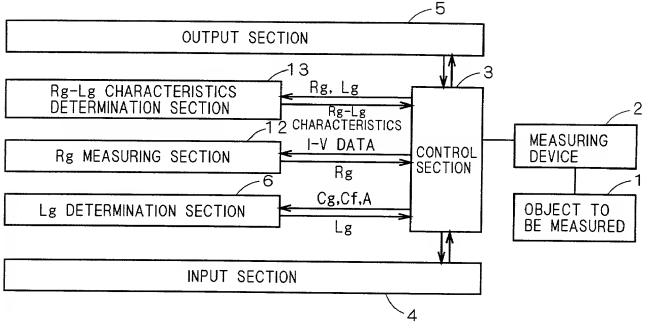
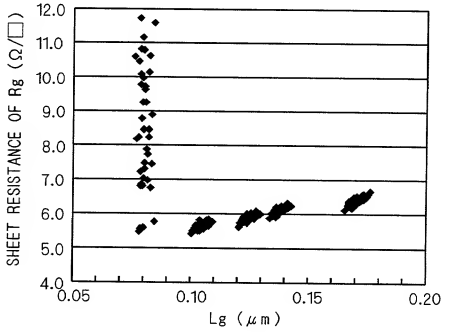

5
OUTPUT SECTION
13
Rg-Lg CHARACTERISTICS DETERMINATION SECTION
Rg, Lg
Rg-Lg CHARACTERISTICS
12
Rg MEASURING SECTION
I-V DATA
Rg
6
Lg DETERMINATION SECTION
Cg,Cf,A
Lg
3
CONTROL SECTION
2
MEASURING DEVICE
1
OBJECT TO BE MEASURED
INPUT SECTION
4

FIG. 15


SHEET RESISTANCE OF Rg (Ω/□)
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
0.05
0.10
0.15
0.20
Lg (μm)